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湖北丹江口市早始新世梳趾鼠类新属种

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摘要 描述了采自湖北丹江口市下始新统上段的两件早期梳趾鼠类标本，其中 V10839 订为李氏鄂豫鼠 (*Hohomys lii*)，为原始的豫鼠科分子；V10840 被鉴定为钟健鼠科分子，属种未定。对新属种与已有属种的对比分析表明早期梳趾鼠类演化快，方向多。

关键词 湖北丹江口市，早始新世，梳趾鼠超科

一、前 言

梳趾鼠科 (Ctenodactylidae) 的近亲可追溯到始新世 (Dawson *et al.*, 1984)。这些始新世的梳趾鼠类发现于中国、蒙古、哈萨克斯坦、印度和巴基斯坦等地(Flynn *et al.*, 1986)。随着新材料的不断发现(李传夔, 1963,1975; Dawson, 1964; Shevyreva, 1972, 1976, 1989; de Bruijn *et al.*, 1982; Hussain *et al.*, 1978; Dawson *et al.*, 1984; Wang, 1984; Dashzeveg, 1990a, 1990b)，不少学者开始认识到始新世梳趾鼠是早期啮齿类的重要成员和基础分子，研究这些动物对于弄清啮齿类的起源和早期历史有重要意义 (Dawson *et al.*, 1984; Kroth, 1984; Luckett and Hartenberger, 1985; Vianey-Liaud, 1985; Li *et al.*, 1989; Wilson, 1989)。

本文将描述采自湖北丹江口市(原均县)习家店镇王家寨附近玉皇顶组中段两件早期梳趾鼠类标本 (以下所称早期梳趾鼠类仅指 Cocomyidae 和 Yuomyidae 两科的始新世属种)。该段地层为紫红色、褐红色泥岩，灰白色中薄层钙质泥岩和泥灰岩夹灰绿色泥岩共同组成的多个泥岩韵律；伴生化石有 *Rhombomylus* cf. *turpanensis*、*R.* sp.、*Advenimus hubeiensis.*、*A.*sp.、cf. *Heptondon* sp.、*Asiocoryphodon conicus*、*Heterocoryphodon flerowi* 及 *Zhongvuanus sichuanensis* 等 (Li and Ting, 1983; 马安成、程捷, 1991)；时代为早始新世晚期。

本文所涉牙齿结构术语依照 Wilson(1938)，头骨结构术语依照李传夔(1963,1975)，早期梳趾鼠的属种归类依 Dawson *et al.* (1984)。

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二、系 统 描 述

啮齿目 Order Rodentia Bowdich, 1821

梳趾鼠超科 Superfamily Ctenodactyloidea Tullberg, 1899

豫鼠科 Family Yuomyidae Dawson *et al.*, 1984

鄂豫鼠属(新属) Genus *Hohomys* gen. nov.

属型种 李氏鄂豫鼠（新属、新种）*Hohomys lii* gen. et sp. nov.。

特征 个体大小接近黄鼠的梳趾鼠。头骨前部短而高；眶下孔较大，颧弓—咬肌结构为雏形的豪猪型(或为始啮型与豪猪型的过渡类型)，颧弓前根后缘在 P4/之后。门齿孔特别大，杏仁形，孔内有向上开口的“V”形屏板。下颌骨为松鼠型，咬肌窝前缘在 M/2 跟座之下。颊齿低冠，丘一脊型齿；P3/结构比超科内其它已知的属种复杂，P4/无后尖但有次尖；上臼齿似 *Cocomys*，但更为方形，前小尖无或不明显；P/4 三角座比跟座高，跟座上有小的下次小尖与下次尖顶端相连。下外脊位置偏内，下臼齿与 *Advenimus* 相近，但 M/1—2 的下次脊较弱，伸向下次小尖，而 M/3 无此脊。

属名由来 属型种产地在湖北和河南的交界处，取两省名拼音首字母（H）以“O”相间，加词尾“-mys”得 *Hohomys*。

李氏鄂豫鼠(新属、新种) *Hohomys lii* gen. et sp. nov.

(图 1；图版 I，1A-E)

特征 同属征。

正型标本 同一个体头骨的前部及其两个下颌的水平支部分，齿列完整(中国科学院古脊椎动物与古人类研究所编号：V 10839)。

种名由来 李传夔教授带队采集了标本，并赠予作者研究，故而以“李氏”作种名为记。

地点及层位 湖北丹江口市习家店镇王家寨大尖；玉皇顶组中段，早始新世晚期。

描述 头骨前部形态构造与 *Cocomys* 相像，但吻部更为短高而粗壮。吻部顶面较平直，两侧骨壁陡直，自后方向鼻端稍有收缩。

鼻骨很长，前端破损，估计超出门齿前缘，后端到达眼眶中部；两侧微向下弯曲。

前颌骨的鼻突部分较为宽大，在吻部侧面与上颌骨的接缝呈前凸的半圆形，表面光滑，无明显的咬肌附着痕。顶面上，鼻突在眶下孔的后上方收缩为一个较宽扁的背突，插到眼眶前部上方，与额骨相接，两者之间的骨缝横向延伸。前颌骨的腭突占了齿缺处的大部分腭面，它与上颌骨的骨缝先横穿腭面，在距 P3/约 2.0mm 处，接近门齿孔时折向前方，止于门齿孔的中部。

上颌骨腭突较小，它与腭骨的接缝在硬腭上呈前凸的拱形，前缘达 P4/与 M1/之间位置。颧突部分已破损，其根部后缘在 M1/与 P4/之间，前缘约在 P4/与 P3/之间；颧突根部腹面有一平坦的小窝；另外在眶下孔下方，颧突根和 P3/之间也有一小窝，此窝或许和表层咬肌附着有关。眶下孔近椭圆形，上下径约 3.0mm，左右径约 2.0mm，它与头骨

的相对大小比 *Cocomys* 稍大，但不象 *Saykanomys* 或 *Yuomys* 那样显著增大。眶下孔的前上角有一小孔，直径不到 1.0mm（该孔下缘的骨壁内还有一圆形小孔，似与供给门齿槽的血管和神经有关）。该小孔前上方的上颌骨表面有一浅窝隐约可见，直径约有 3.0mm，为一咬肌附着痕，深层咬肌的一部分穿过稍增大的眶下孔附着此处。这样的眶下孔具备了豪猪型头骨的基本特征，但不象典型的豪猪型头骨的眶下孔那样显著，是雏形的豪猪型头骨的眶下孔，或可看作是始啮型与豪猪型之间的过渡类型。上颌骨在眼眶前上方包围泪骨，并与额骨有一横向接缝。上颌骨眶区部分保存不好。

泪骨在眼眶前上角，面突呈三角形，眶区部分保存不好。

额骨仅左侧一块的背部保存较好。后部在 M2-M3/之上方有一钝的眶后突，显示出硕大的眼窝。

腭骨仅腭板部分保存较好。在腭板中部 M2/内侧及前部靠近与上颌骨腭突接缝处，各有一对后腭孔。腭板后缘在 M3/之间，中央有一明显的腭后棘。

门齿孔特别大，占了腭板齿缺处的几乎全部，呈杏仁形，前端距门齿后缘约有 2.0mm，后缘正好达 P3/的位置，前后长约 6.0mm，左右最大宽度达 4.9mm。有趣的是，在门齿孔的窝腔内，象 *Heomys* 一样有左右对称的两块骨屏，两屏在孔的中央接合，两侧倾斜地伸向鼻腔上部，构成一个"V"形托槽（李传夔，1977）。

左右下颌骨的上升支均已破损。水平支上咬肌窝前缘钝圆，伸至 M/2 跟座下方；一

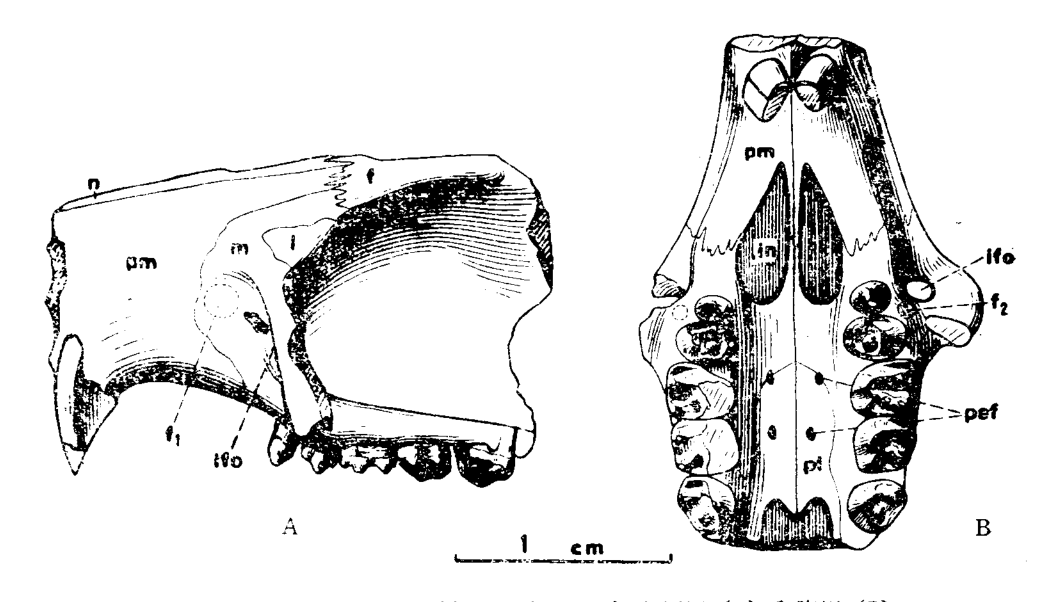


图 1 李氏鄂豫鼠（新属、新种）头骨（V10839）左侧视（A）和腹视（B）

Fig 1 The left lateral view (A) and the ventral view (B) of the skull of *Hohomys lii* gen. et sp. nov. (V10839)

f: 额骨 frontal; f1: 部分深层咬肌附着处 fossa for the attachment of some part of the *Masster profundus*; f2: 表层咬肌附着处 fossa for the attachment of the *Masseter superficialis*; ifo: 眶下孔 infraorbital foramen; in: 门齿孔 incisive foramen; l: 泪骨 lacrimal; m: 上颌骨 maxilla; n: 鼻骨 nasal; pl: 腭骨 palatine; plf: 腭孔 palatine foramen

个较大的颏孔恰好在 P/4 之前，距齿槽缘 2.0mm，另外在 P/4 后齿根下方有一小的颏孔。下颌骨为松鼠型下颌。

上门齿横截面窄长，前缘浑圆，截面中央有细长的髓腔。釉质层仅分布至门齿侧面的前半部。

P3/长和宽均约为 P4/的一半左右，只有一个齿根，截面卵圆形。齿冠唇侧有一高大锥形的前尖。前尖后方有一很小的后尖，长在前尖的后坡上。舌侧有一低的原尖，生于齿缘，并向唇侧主尖基部伸出前后脊，此两脊分别绕过齿冠的前后外角。原尖后方萌出雏形的次尖架。

P4/双根。齿冠前后压缩，截面为卵圆形。唇侧有一高大的前尖，呈扁锥形，紧靠唇缘，顶端稍向舌侧包卷。前尖后坡有一小的突起，或为未萌出的后尖，但未见呈明显尖形的后尖出现。舌侧有一钝锥形的原尖，形态粗壮，比前尖低。原尖后方有一弱的次尖，大小不到原尖的一半，占据齿冠的后内角，与原尖之间有小沟相隔。后小尖呈孤立的圆锥形，大小超过次尖。前小尖小而明显，位于原脊中部。前后齿带发育，前齿带短而稍宽，起自前小尖前方，伸至前尖前外角处，齿带位置由内向外渐高；后齿带细长，从次尖向外延伸，绕过唇侧主尖的后外角，齿带位置整体上较高。

上臼齿从 M1/到 M3/依次增大，为低冠的丘一脊型齿，舌侧齿冠要比唇侧的高一倍。M1/和 M2/近于方形，冠面结构也相似。前后尖锥形，后尖比前尖稍小；原尖占了舌侧齿冠的大部，次尖小于原尖，位于齿冠后内角，两者之间有一浅凹相隔，但顶端仍有一弱脊相连，M2/的次尖稍有增大。原脊发育，但前小尖不显著(左 M2/上存在此尖)。后小尖显著，几与次尖等大，呈钝锥形，与原尖仅基部相连。前后齿带发育，前齿带稍宽而短，从原尖前方伸至齿冠前外角，在此形成一个显著的前附尖；后齿带细长，在 M1/的齿冠后外角处形成一个小的后附尖 (M2/无此尖)。前后尖之间的齿冠唇侧有一小的中附尖。M3/因后外角退化后部呈半圆形，其后尖和次尖退化成后齿缘上的两个小突起；后小尖较大，呈孤立的钝锥形，没有后脊。M3/的前半部与 M1-2/相似，只是原尖更为粗壮，原脊上有一退化的前小尖突起。

左右下门齿前段均破损，其断面呈左右压缩的卵圆形。和上门齿一样，釉质层只盖至侧面前部。

下颊齿由前向后明显增大。

P/4 三角座比跟座稍窄但明显要高。下后尖和下原尖成尖锥形，下后尖更高大且靠前，三角盆为前后开口的斜槽；三角座前后壁陡直，没有前齿带。跟座上下次尖稍小于下内尖，两者之间的后齿缘上有一很小但仍清晰可辨的下次小尖，三尖顶部相连；下外脊发育，未见下中尖。由三角座后壁、下外脊及跟座三尖形成一个浅的跟盆。P/4 各尖中，多数仅顶端稍有磨蚀，唯下次尖磨至齐下外脊顶部。

下臼齿磨蚀不深。除右侧 M/3 之外，其余牙齿的冠面均已有所破损，但左右对照也能辨认基本结构。三角座和跟座高差不明显，三角座要窄些。下后尖尖锐，下原尖稍钝，后脊低，后脊-II 短，止于齿冠中线，成为下原尖向内伸的一个低棱，三角盆成为向后开口的斜槽。跟座上下内尖、下次尖和下次小尖发育。在 M/1-2 上，下次尖钝锥形，并向下次小尖前外角伸出一细脊；下次小尖沿后齿缘左右伸开，两侧翼与下次尖及下内尖之间

有小凹相隔，同时下次小尖向后突出；下内尖最高，锥形，下次脊短，不与下次尖相接，而伸向下次小尖。下外脊明显，中部有一小的下中尖。跟盆浅宽，在下后尖及下内尖之间的开口呈开阔的U形。M/3 的跟座显得窄长，后缘粗壮，跟座各尖都分布在齿缘，呈钝锥形，基部相连，下外脊上下中尖较明显。

三、比较讨论

Hohomys 无疑具备了早期梳趾鼠类的基本特征。如松鼠型下颌；颊齿列自前向后递次增大；丘一脊型低冠齿；上颊齿次尖和原尖分开；后脊指向原尖；M3/后部退化；下臼齿后脊发育而后脊-II 往往较短；P/4 下原尖和下后尖斜列，跟座较低；下臼齿跟座长，下次尖发育。同时，它同已发现的所有早期梳趾鼠类均各有差异：

1. 与 *Cocomys* 的比较

相似点有：1）下颌咬肌窝前缘在 M/2 跟座之下；2）颊齿脊形化程度弱；3）P4/无后尖；4）上臼齿次尖小；5）P/4 无后脊及后脊-II，三角盆前后开放；6）下臼齿外脊上下中尖弱小。这些相似性在早期梳趾鼠类中为原始性状。两者的差异点有：1）*Hohomys* 的 P4/有次尖，*Cocomys* 无；2）*Hohomys* 的上臼齿无前小尖，*Cocomys* 有；3）*Hohomys* 的 M3/后外角退化，后小尖锥形，无后脊，*Cocomys* 的 M3/后外角明显，后小尖脊形；4）*Hohomys* 的 P/4 有下外脊，已分化出下次尖和下次小尖，*Cocomys* 的 P/4 无下外脊，未分化出下次尖和下次小尖；5）*Hohomys* 的 M/1-2 有短的次脊，*Cocomys* 的 M/1-2 无此脊；6）*Hohomys* 的 M/1-2 下次小尖向后突出，*Cocomys* 的 M/1-2 下次小尖侧扁；7）*Hohomys* 的眶下孔增大，为豪猪型，*Cocomys* 则为始啮类型。在这些差异上，*Hohomys* 大多表现得既比 *Cocomys* 进步，又可能显示出某种系统分异的特征。

2. 与 *Tamquammys* 的比较

相似点：*Hohomys* 与 *Tamquammys* 都有 *Hohomys* 与 *Cocomys* 相似点中的 1)、3)、4)、5)、6)诸点，另外还有 A）P4/都有次尖；B）M/1-2 下次小尖向后突出；C）豪猪型头骨。除增加的三点外，前五点如前所述在早期的梳趾鼠类中是原始性状。差异点有：1）*Tamquammys* 的上臼齿前小尖明显，*Hohomys* 不具此尖；2）*Hohomys* 的 P/4 具下外脊，分化出下次尖和下次小尖，*Tamquammys* 的 P/4 不具备这些结构；3）*Hohomys* 的下臼齿上次脊短，*Tamquammys* 的下臼齿有完整次脊。这里，1)、2) 两点上 *Hohomys* 表现得更为进步，而 3) 点上 *Hohomys* 要比 *Tamquammys* 原始，这或许反映了演化方向上的差异。

3. 与 *Tsinlingomys* 的比较

Tsinlingomys 的材料不多，仅属型种的两个不完整下颌，可资比较之处不多。依现有材料，*Hohomys* 与它的相似处有：1）下颌咬肌窝在 M/2 跟座下方；2）下臼齿内

尖脊不接下次尖或下外脊形成完整次脊。两者的差异点有：1）*Hohomys* 的下颊齿后脊-II 无（P/4）或较短（M/1-3），三角盆开放，*Tsinlingomys* 下颊齿后脊-II 长，三角盆封闭；2）*Hohomys* 的 P/4 跟座上有下外脊、下次尖和下次小尖，*Tsinlingomys* 的 P/4 跟座上没有这些结构；3）*Hohomys* 下臼齿的下外脊上有下中尖，*Tsinlingomys* 无此尖；4）*Hohomys* 的 M/1-2 跟盆后缘闭合，*Tsinlingomys* 的 M/1-2 在下次尖和下次小尖之间有缺口；5）*Hohomys* 的 M/3 无下次脊，*Tsinlingomys* 的 M/3 则有。从上述的差异来看，*Tsinlingomys* 的 P/4 的臼齿化程度比 *Hohomys* 的低，但它的下臼齿的后脊-II 较发达，且跟盆结构较特殊，代表了早期梳趾鼠类中较为特殊的一支。*Hohomys* 与它的差别较大。

4. 与 *Yuomys* 的比较

相似点有：1）上臼齿原脊中段细，无前小尖；2）P/4 跟座上有下外脊，分化出下次尖和下次小尖；3）M/1-2 的下次小尖向后突出明显；4）眶下孔为豪猪型类型。这些特征在早期梳趾鼠类中为进步特征。两者的差异点有：1）*Hohomys* 下颌咬肌窝前缘在 M/2 跟座之下，*Yuomys* 的则在 M/2 三角座之下；2）*Yuomys* 颊齿的脊形化程度明显高于 *Hohomys*；3）*Hohomys* 的 P4/无后尖但有次尖，*Yuomys* 的 P4/正相反；4）*Yuomys* 上臼齿次尖大小接近原尖，*Hohomys* 的次尖则较小；5）*Hohomys* 的 M3/后小尖成孤立尖形，*Yuomys* 的则形成后脊；6）*Yuomys* 的下颊齿均有完整次脊，下外脊上无下中尖，*Hohomys* 的下颊齿无完整次脊，下外脊上有弱的下中尖；7）*Yuomys* 的 P/4 后脊和后脊-II 发育，*Hohomys* 的 P/4 无此两脊。从上述差异来看，*Hohomys* 比 *Yuomys* 明显原始。

5. 与 *Advenimus* 及 *Saykanomys* 的比较

Saykanomys 与 *Advenimus* 很像，几乎可视为 *Advenimus* 的同物异名（Dawson *et al.*, 1984），本文将两者放在一起与 *Hohomys* 作比较。*Hohomys* 和它们的相似点有：1）下颌咬肌窝前缘在 M/2 跟座下方；2）P4/有小的次尖（*Advenimus* 未保存）；3）上臼齿次尖较小（*Advenimus* 未保存）；4）P/4 无后脊及后脊-II；5）P/4 跟座上有下外脊，分化出下次尖和下次小尖；6）M/1-2 下次小尖很大，明显后突；7）下臼齿的下外脊上有下中尖；8）M/1-2 有下次脊，但未形成完整的次脊；9）眶下孔为豪猪型类型。从这些相似性可以看出 *Hohomys* 与 *Advenimus* 及 *Saykanomys* 较接近，其中 2）、5）、6）、8）、9）为早期梳趾鼠类中的进步特征。*Hohomys* 与它们的差异点有：1）*Hohomys* 的 P4/无后尖，*Saykanomys* 的则有（*Advenimus* 未保存）；2）*Hohomys* 的上臼齿无前小尖，*Saykanomys* 则有（*Advenimus* 未保存）；3）*Hohomys* 的 P/4 的下次小尖极小，与下内尖及下次尖顶端相联，*Advenimus* 及 *Saykanomys* 的 P/4 的下次小尖较大，向后突出；4）*Hohomys* 的 M/3 下内尖处无内尖脊，*Advenimus* 及 *Saykanomys* 的 M/3 则象 M/1-2 一样有下次脊。从这里可以看出 *Hohomys* 与 *Advenimus* 及 *Saykanomys* 也有不少差别，后两者比 *Hohomys* 具有更多的进步性状，但不及 *Yuomys* 那样特化。

6. 与 *Petrokozlovia* 的比较

Petrokozlovia 仅有一种 *P. notos*，未保存完整齿列，且磨蚀严重。依现在材料，它与 *Yuomys* 较接近（李传夔，1975）。它和 *Hohomys* 的异同基本上不超出 *Yuomys* 与 *Hohomys* 的异同，只是它的 P4/也有次尖（与 *Hohomys* 相同而与 *Yuomys* 不同）。它和 *Yuomys* 一样，比 *Hohomys* 明显进步。

Shevyreva (1989) 和 Dashzeveg (1990a, 1990b) 记述了产自蒙古和中亚地区的早始新世早期的梳趾鼠类及其它啮齿类化石。由于材料非常破碎，在描述归并上尚需做进一步的工作，本文暂不将它们与湖北标本详细对比，从总貌上看，它们个体要小，结构上也更为原始。

除了以上所述的 *Hohomys* 同已有的早期梳趾鼠类各有差异外，*Hohomys* 还有区别于所有已发现的早期梳趾鼠类的特性。*Hohomys* 的头骨前部短而高，更接近于 *Heomys*；大的门齿孔呈前尖后圆的杏仁形也较独特，而门齿孔内枷阀式的骨隔也和 *Heomys* 相似（李传夔，1977）；P3/退化程度较小，冠面结构比所有其它的早期梳趾鼠类都复杂，也显得和 *Heomys* 接近。这些特点反映了 *Hohomys* 在早期梳趾鼠类中显得原始的一面。

事实上，*Hohomys* 的眶下孔大小及前臼齿的臼齿化程度在早期梳趾鼠类中也是很独特的。虽然笔者将 *Hohomys* 的眶下孔纳入豪猪类型，比始啮型的 *Cocomys* 的眶下孔要进步，但这样的眶下孔却比其它具豪猪型头骨的早期梳趾鼠类的眶下孔明显要小，更显原始。*Hohomys* 的 P4/象 Cocomyidae 各属一样，未分化出后尖，而 P/4 则与 Yuomyidae 各属相似，有下次尖和下次小尖。结合起来，可以认为 *Hohomys* 的 P4 的臼齿化程度介于已发现的 Cocomyids 与 Yuomyids 之间。如果把前臼齿的臼齿化程度作为早期梳趾鼠类的分类依据，并把臼齿化程度高作为亲缘关系的关键指标，那么，正如前述的那样，*Hohomys* 与 Cocomyidae 各属的共性以原始性状为主，而它同已有的 Yuomyidae 各属则共有一系列进步特征，显示出较近的亲缘关系，同时它又比已有的

表1 齿列测量数据（单位：毫米）

Table 1 The measurements of the dentitions (in mm)

Upper	I*/ 长 L	I*/ 宽 W	齿缺 长 Diastema	P3/ 长 L	P3/ 宽 W	P4/ 长 L	P4/ 宽 W	M1/ 长 L	M1/ 宽 W	M2/ 长 L	M2/ 宽 W	M3/ 长 L	M3/ 宽 W	P4/-M3/ 长 L
Hohomys lii V10839	2.70	2.00	7.25	1.40	1.60	2.00	2.55	2.15	2.50	2.25	2.50	2.30	2.50	8.90
Lower	**I/* 长 L**	**I/* 宽 W**	**齿缺 长 Diastema**			**P/4 长 L**	**P/4 宽 W**	**M/1 长 L**	**M/1 宽 W**	**M/2 长 L**	**M/2 宽 W**	**M/3 长 L**	**M/3 宽 W**	**P/4-M/3 长 L**
Hohomys lii V10839	2.45	1.85	3.15			1.90	1.50	2.25	2.00	2.45	2.35	2.70	2.20	9.80
Cocomyidae gen. et sp. indet. V10840	2.50	1.85	3.20			1.35	1.45	2.00	2.00	2.10	2.05	2.50	2.10	8.95

yuomyids 都原始，可视为 Yuomyidae 的原始分子。

Cocomyidae gen. et sp. indet.

（图版 I，2A—C）

在 *Hohomys lii* 正型标本（V10839）的产地附近(青塘岭)同一层位中还发现一件早期梳趾鼠类的右下颌标本(中国科学院古脊椎动物与古人类研究所编号：V10840)，下齿列完整，形态构造较为独特，值得介绍。但要建立新的分类单元还缺少充足的材料证据，这里仅作一简单的记述比较。

下颌水平支较为短高，为松鼠型下颌。外表面光滑，在 P/4 前齿根之下 2.0mm 处有一小的颏孔，该孔之前 1.0mm 处有一较大的主要颏孔。咬肌窝较深，咬肌脊前缘 V 形，伸至 M/2 跟座下方。内表面陡直，下颌接合面后伸至 M/1 下方，角突断至根部。上升支破损。

齿式为/1.0.1.3。门齿与颊齿之间的齿缺长约 3.0mm。颊齿由前向后明显增大。

下门齿断面成窄长的卵圆形，前方釉质层只盖至侧面前半部。中央有细长的髓腔。

P/4 三角座明显高于跟座，宽度相近。后脊和后脊-II 不发育，三角盆前后开口。下内尖位于跟座的后内角，成尖锐的锥形尖，无内尖脊；跟座后外缘有一低的后外缘脊，未分化出下次尖和下次小尖；下外脊不明显，无下中尖；跟盆浅，开口呈 V 形。

下臼齿三角座与 P/4 相似，只是后脊明显，后缘从下原尖伸出一短的后脊-II，不达下后尖，三角盆呈向后开口的斜槽；三角座与跟座的高差也不明显。M/1-2 跟座明显宽于三角座，下次尖、下次小尖及下内尖的形态、大小与 *Advenimus* 的相应结构相似，唯下次脊要弱些，另外下外脊上的下中尖也不如 *Advenimus* 的发育。M/3 跟座窄长，下次脊比 *Advenimus* 的更为弱小。

V10840 仅有一个右下颌，这给确定其系统位置带来了困难。依现有材料，V 10840 的下颌形态大小及下臼齿的结构与 *Advenimus* 及 *Hohomys* 相像。如 M/1-2 有明显增大，具有向后突出的下次小尖。从 M/3 来看，V10840 似与 *A. burkei* 尤为接近，两者的 M/3 均有一下次脊，只是 V10840 的更弱些，而 *Hohomys* 的 M/3 无此脊。但是 V10840 的 P/4 却与 *Advenimus* 及 *Hohomys* 截然不同：没有下外脊，未分化出下次尖和下次小尖。这样的 P/4 与 Cocomyidae 的接近。如果把 V10840 归入 Cocomyidae，其下臼齿可看作是脊形化程度介于 *Cocomys* 与 *Tamquammys* 之间的中间类型。当然，V10840 的个体要比 *Cocomys*、*Tamquammys* 及 *Tsinlingomys* 都要大，下次小尖更向后突出。但据笔者观察，像 *Yuomys*、*Petrokozlovia* 及 *Saykanomys* 所具有的臼齿化的 P4/，在咬合时，其后脊需要相应的 P/4 的下次尖、下次小尖协助才能发挥研磨作用，V 10840 的 P/4 所具有的低弱的下后边缘很难发挥这种协助作用。由此推断，V 10840 的 P4/不大可能有后尖及相应的后脊。因此，将 V10840 归入 Yuomyidae 是很困难的，在目前的状况下，将它暂归入 Cocomyidae 较为合适。

四、结　语

自从李传夔(1963)记述 *Tsinlingomys youngi* 以来，早期梳趾鼠类陆续被发现，也

有学者进行了一些高阶元的系统小结（如 Dawson *et al.*, 1984; Flynn *et al.*, 1986; Korth, 1984; Dashzeveg, 1990b; Wang, 1994 等）。同后期的啮齿类相比，早期梳趾鼠类的研究史较短，发现的材料较少，但也显示出后期啮齿类那种进化快、平行演化多的演化模式。而迄今为止这类动物中发现完整材料的类群很少，要确立反映系统发育关系的分类框架尚需更多（尤其是较完整）的材料证据。依前臼齿的臼齿化程度划分出的两个科 Cocomyidae 和 Yuomyidae (Dawson *et al.*, 1984) 或许不能完全反映出系统发育关系 (Flynn *et al.*, 1986)，但就目前的研究程度而言，尚需在上述框架下（注：Wang, 1994 认为梳趾鼠类可分两支，而实际上每支早期的基本成员分别是上述两科的分子）积累更多的材料。本文遵循这一思路建立一新属 *Hohomys*，并将它作为迄今记录的 Yuomyidae 的最原始分子；另外将 V10840 暂归入 Cocomyidae，但它与该科已有各属差别明显，反映出 Cocomyidae 内部有较大分异。

致谢 李传夔先生将标本交由笔者研究，并给予指导；王伴月先生提供对比标本和文献资料，并提出重要意见；本所野外队收集了标本；谢树华及王原先生协助修理部分标本；史庆礼先生帮助查阅部分资料；张杰先生摄制图版；胡惠清女士绘制插图；本所早期哺乳动物研究室的各位先生审阅了初稿。对以上诸位，笔者在此一并致谢。

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NEW LATE EARLY EOCENE CTENODACTYLOID RODENTS (RODENTIA, MAMMALIA) FROM DANJIANGKOU, HUBEI

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Key wards Danjiangkou, Hubei, Early Eocene, Ctenodactyloidea

Summary

The close relatives of Ctenodactylidae were present early in Eocene of Asia. As basal members of early rodents, they are important for us to understand the early history of rodents. In the present paper a new genus and species, ***Hohomys lii***, referred to Youmyidae, and a specimen of gen. indet., referred to Cocomyidae, are described. They were collected from Yuhuangding Formation near Wangjiazhai Village, Xijiadian Town, Danjiangkou City (formerly Junxian County), Hubei. The taxa of the vertebrate fauna associated with these two new ctenodactyloid rodents are ***Rhombomylus*** cf.***turpanensis***, ***R.*** sp., ***Advenimus hubeiensis***, ***A.*** sp., cf. ***Heptondon*** sp., ***Asiocoryphodon conicus***, ***Heterocoryphodon flerowi*** and ***Zhongvuanus sichuanensis*** etc., which suggest an age of late Early Eocene.

Description and discussion

Order Rodentia Bowdich, 1821

Superfamily Ctenodactyloidea Tullberg, 1899

Family Yuomyidae Dawson *et al.*, 1984

Genus *Hohomys* gen. nov.

Type species *Hohomys lii* gen. et sp. nov.

Diagnosis Medium-sized ctenodactyloids with the size as *Citellis*. The anterior part of the skull short and high, with the zygomasseteric structure of primitive hystricomorph type (or intermediate condition between the protrogomorph and the hystricomorph) and the infrorbital foramen of a medium size. The incisive foramen very large, almond-shaped, with a downward V-shaped osseous screen in it. The position of the posterior border of the anterior zygomatic root at the level between P4/ and M1/. The lower jaw sciurognathous type, with the anterior border of the masster fossa just below the talonid of M/2. Cheek teeth brachyodont, bunodont-lophodont. P3/ more complicated than that of all the other known ctenodactyloids. P4/ with a small hypocone but no distinctly cuspid metacone. The upper molars similar to those of *Cocomys*, but more square and with no protoconule. The trigonid of P/4 obviously higher than the talonid and the talonid with a ectolophid and a little hypoconulid connecting with both the entoconid and the hypoconid. The lower molars similar to those of *Advenimus*, but M/1-2 with a weaker entoconid crest while M/3 with no entoconid crest.

Etymology The name, coming from "Hubei" and "Henan" and the suffix "-mys", reflects that the genotype was collected from a locality along the border of Hubei and Henan Provinces.

Hohomys lii gen. et sp. nov.

(fig.1; pl. I, 1A—E)

Diagnosis As in the genus.

Holotype The anterior part of a skull and the associated lower jaws with complete upper and lower dentitions (IVPP cat. no. V10839).

Materials Only the holotype.

Locality and age Dajian of Wangjiazhai Village, Xijiadian, Danjiangkou, Hubei; Yuhuangding Formation, late Early Eocene.

Etymology The species' name is given to Professor Li Chuankui who collected the specimen and provided inspiration and guidance in the project.

Description The anterior part of the skull is similar to that of *Cocomys*, but the rostrum is shorter, higher and more robust. The top of the snout is flat, while the side is relatively steep. The rostrum reduces forward weakly.

The nasals are long, extending backward to the middle of the orbit. The nasal bone terminates anteriorly to the incisor although the tip in the holotype is destroyed. The transverse section of nasals bend down slightly on both lateral sides.

The premaxilla is characterized by a wide and long dorsal process, which extends backward to the place above the anterior part of the orbit. The premaxilla-frontal suture nearly runs transversely, going a little anteriorly to a point medial to the place of the lacrimal and joining the premaxilla-maxillary suture. The latter wings onto the lateral surface of the rostrum, then goes downward and forms a serrated line joining the incisive foramen on its posterior portion.

The incisive foramen is very large, almond-shaped and pointed anteriorly. The anterior point of the foramen is 2.0 mm posterior to the border of the alveoli of incisors, while the posterior border just at the place medial to the P3/. The length of the incisive foramen is about 6.0mm while the largest width of the incisive

foramen is 4.9mm. In the foramen there is a downward V-shaped osseous screen.

The palatal process of the maxilla is short, and the palatine-maxillary suture has a shape of parabola with its anterior edge ending at a place between P4/ and M1/. The anterior surface of the anterior zygomatic root is between P3/ and P4/ while its posterior surface between P4/ and M1/. Below the inforaorbital foramen there is a small and shallow depression between the zygomatic root and P3/. The infraorbital foramen, enclosed by the maxilla, is relatively larger than that in *Cocomys* but obviously smaller than that in *Yuomys* and *Saykanomys*. It is elliptical, with the diameters about 3.0mm dorsoventrally and 2.0mm transversely. There is a small hole on the maxilla just anterior to the upper border of the infraorbital foramen. Just anterior to this hole is there a shallow round depression on the surface of maxilla, with the diameter about 3.0mm, which can be interpreted as the attachment of muscles. All these suggest that some part of the masseter medialis penetrate the infraorbital foramen. Such a zygomasseteric structure can be included in the hystricomorph type, but its infraorbital foramen is much smaller than that in those with typical hystricomorphous zygomasseteric structure. Maybe such zygomasseteric structure can be considered as the hystricomorph type of primitive evolutionary stage, or the transitional type from the protrogomorphous to the hystricomorphous.

The lacrimal is badly preserved, which forms part of the anteromedial orbital border.

Frontals are destroyed only but the dorsal part of the left one. A moderate posterior process is present at the level between M2/ and M3/, which indicates a large orbit.

The palatal process of the palatine extends anteriorly to the level between the P4/ and M1/, and backward to the level of M3/, and has a projection directing posteriorly. There are two pairs of palatine foramina, the anterior ones are located to the front of M1/ while the posterior ones between M1/ and M2/.

The lower jaw is of sciurognathous form as those of all known ctenodactyloids. The vertical ramus of the mandible is destroyed. The masseteric fossa extends forward to the place below the talonid of M2/. There are two mental foramina, the large one locating 2.0mm below the anterior border of P/4, and the small one below the talonid of P/4.

The dental formula is 1.0.2.3/1.0.1.3.

The upper incisor is robust. In section the tooth is long oval, with a very narrow and elongated pulp. The enamel cap of the tooth is limited to the anterior half of the side.

P3/ has only one root. The tooth is oval-shaped in outline and about half of the length and the width of P4/. The paracone is a high conical cusp and the metacone is a tiny one at the posterior slope of the former. The protocone is a lower lingual cusp, with two crests (loph or cingulum) first direct to the buccular cusps, then going along the antero-exterior and postero-exterior corners of the tooth separately. An initial hypocone shelf is present at the postero-interior corner of the tooth.

P4/ is double-rooted and compressed anteroposteriorly with an oval outline. The tooth is characterized by only one main buccal cusp, the paracone. There is a tiny

swelling on the posterior slope of the paracone, but no cuspid metacone present. The protocone is lower but stout. The hypocone is small, indistinct from the posterior cingulum. The metaconule is isolated and completely cuspid, with the size larger than that of hypocone. The protoconule is present as a tiny swelling at the protoloph. The anterior cingulum is narrow, long and lower-loaded, while the posterior one relatively wider, shorter and higher-loaded.

The upper molars increase in size posteriorly. The M1/ and M2/ are similar to each other. The metacone is slightly lower and smaller than the paracone, while the hypocone is obviously smaller and lower than the protocone as the latter occupies the most of lingual part of the crown. The protoloph bears no protoconule (only but the left M2/ of the type bears a tiny swelling as the protoconule). The metaconule is conical, and as large as the hypocone, forming the main part of the metaloph, which is separated from the protocone by a narrow gap. The anterior cingulum is very distinct and united to a distinct parastyle at the anterobuccal corner of the tooth. The posterior cingulum is slightly slender and united to a tiny metastyle at the posterobuccal corner of the tooth (M2/ of the type bears no metastyle). A tiny mesostyle is present buccal to both the paracone and the metacone. The posterior half of M3/ is semicircular while the anterior half is similar to that of M1-2/. Its metacone and hypocone degenerate into two swellings on the posterior edge. The metaconule is large, conical and isolated. There is no metaloph.

The lower incisor is similar to the upper one in section, but smaller than the latter.

The lower cheek teeth obviously increase in size posteriorly.

P/4 is molarized, with the trigonid slightly narrower but distinctly higher than the talonid. The metaconid is the highest cusp and is oriented diagonally to the protoconid. The trigonid basin opens both anteriorly and posteriorly due to the absence of the metalophid and the metalophid-II. On the talonid there is a small but distinct hypoconulid locating between the relatively higher entoconid and hypoconid and connecting with them. The ectolophid bears no mesoconid.

The trigonid of the lower molar is slightly higher but narrower than the talonid. The metaconid is sharp and connected to the blunt protoconid by a low metalophid. The metalophid-II is short, so the trigonid basin opens posteriorly. There are three main cusps on the talonid. On M/1-2, the entoconid is conical and the highest, with a crest directing to (but not connecting to) the hypoconulid. The hypoconid also has a low crest direct to the hypoconulid. The hypoconulid projects posteriorly, and with two wings along the posterior border of the tooth. The ectolophid is distinct, bears a small mesoconid. The talonid of M/3 is relatively narrower but longer than those of M/1-2, with three main cusps all along the border, no entoconid crest, but the mesoconid distinct.

Discussion The *Hohomys* obviously possesses characters of early ctenodactyloids, such as those listed here: lower jaw of sciurognathous form; cheek teeth brachyodont and bunodont-lophodont, and increasing posteriorly in size; the hypocone separated from the protocone; metaloph direct to the protocone; the posterior half of M3/ degenerating; P/4 with the metaconid diagonally to the protoconid and the trigonid obviously higher than the talonid; the lower molar with a complete

metalophid and a short metalophid-II; the talonid of M/1-2 long, with a hypoconulid.

The P4/ of *Hohomys*, with no metacone, is similar to that of known cocomyids, while its P/4, with distinct hypoconid and hypoconulid, is similar to that of known yuomyids. If we agree that the degree of molarization of P4 is the basis for classification of early ctenodactyloids and the higher molarization is the diagnostic criterion, we should refer *Hohomys* to Yuomyidae definitely. But comparing with other yuomyids, *Hohomys* shows many primitive characters, such as P3/ with three main cusps, P4/ without metacone, P/4 with a small hypoconulid, and the infraorbital foramen much smaller than that of typical hystricomorphous form. All these traits suggest that *Hohomys* is more primitive than all other yuomyids. Even more, *Hohomys* is more similar to *Heomys* than any other early ctenodactyloids in the structure of P3/, the shape of the rostrum of the skull and the structure of the incisive foramen, which shows the primitivity of *Hohomys* in early ctenodactyloids, even in all rodents. The differences among *Hohomys*, cocomyids, and other yuomyids indicate that early ctenodactyloids, like late rodents, have a pattern of fast and highly diversified evolution.

Cocomyidae gen. et sp. indet.

(pl. I, 2A—C)

A right lower jaw of some unknown early ctenodactyloids (IVPP cat. no. V10840) was recovered recently at Qingtangling (a locality near Wangjiazhai Village) from the middle member of the Yuhuangding Formation where the holotype of *Hohomys lii* had been collected. The specimen is well preserved (only but the angular and the vertical ramus), with complete lower dentition. But such a lower jaw is still not enough to found a new taxon.

The lower jaw is deep and short, of sciurognathous type. The anterior border of the masseter fossa is deep and V-shaped, extending forward to beneath the talonid of M/2. A main mental foramen present below the diastema, while a tiny one below the anterior root of P/4. The symphysis is long, extending backward to the level of the main mental foramen.

The dental formula is/1.0.1.3. The diastema is 3.0mm long, and the cheek teeth increase in size posteriorly.

The cross-section of the incisor is long oval, with the enamel cap extending backward to the half of the lateral side.

The trigonid of P/4 is higher than the talonid. The metaconid is sharp and the highest, oriented diagonally to the blunt protoconid. The trigonid basin, with no metalophid and metalophid-II developed, is open both anteriorly and posteriorly A sharp entoconid present at the posterolingual corner of the talonid. A posterobuccal crest present at the posterior and posterobuccal edge of the talonid, with no hypoconid and hypoconulid developed.

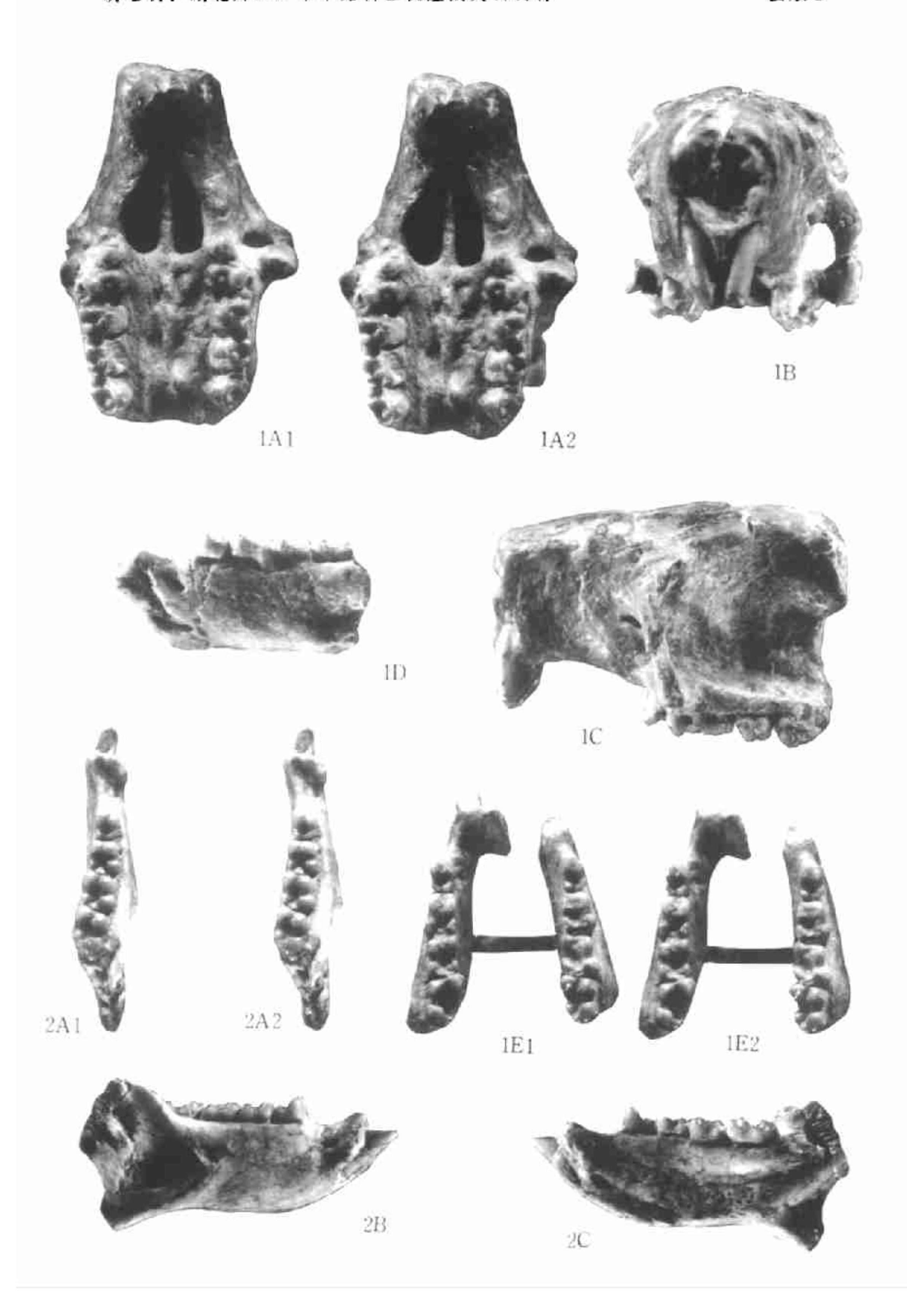
Trigonids of lower molars are similar to each other, with the sharp metaconids diagonally to the protoconids, the metalophids complete and the metalophid-IIs short, and the basins open posteriorly. The talonid of M/1—2 is wider than the trigonid, the arrangement of the hypoconid, the hypoconulid and the entoconid

is similar to that of *Advenimus* and *Hohomys*, but with the entoconid crest and the mesoconid weaker than those in *Advenimus*. The talonid of M/3 is narrow and long, with the entoconid crest much weaker than that of *Advenimus*. Such a molar structure, with a posteriorly projecting hypoconulid and large size, is obviously different from that of cocomyids.

Although the molar structure of V10840 is very similar to that of *Advenimus* and *Hohomys*, its P/4, with no hypoconid and hypoconulid, is similar to that of cocomyids, and distinctly different from the molarized P/4 of all yuomyids. Such a P/4 is difficult to occlude with a fully molarized P4/. So it is difficult to assign the specimen to Yuomyidae. If V10840 is referred to Cocomyidae according to the basis of classification suggested previously in this paper, its molar can be looked as be lophodont in some degree between *Cocomys* and *Tamquammys*. As rodents have a pattern of fast and often parallel evolution, it is difficult to identify the isolated lower jaw of V10840 definitely, and I assign it to Cocomyidae as gen. indet. for the moment.

图版 I 说明 (Explanations of plate I)

1. 李氏鄂豫鼠(新属、新种) (*Hohomys lii* gen. et sp. nov.) V10839
   正型标本 (Holotype) ×3
   A1.2.头骨腹视,立体照片 (ventral view of the skull, stereophotograph)
   B.头骨前视(rostral view of the skull)
   C.头骨左侧视(left view of the skull)
   D.左下颌骨唇侧视 (labial view of the left mandible)
   E1.2.下齿列冠面视,立体照片(crown view of lower dentitions, stereophotograph)
2. 钟健鼠科,属、种未定 (Cocomyidae gen. et sp. indet.) V10840 ×3
   A1.2. 右下齿列冠面视,立体照片(crown view of the right lower dentition, stereophotograph)
   B.右下颌骨唇侧视(labial view of the right mandible)
   C.右下颌骨舌侧视(lingual view of the right mandible)


1A1
1A2
1B
1D
1C
2A1
2A2
1E1
1E2
2B
2C